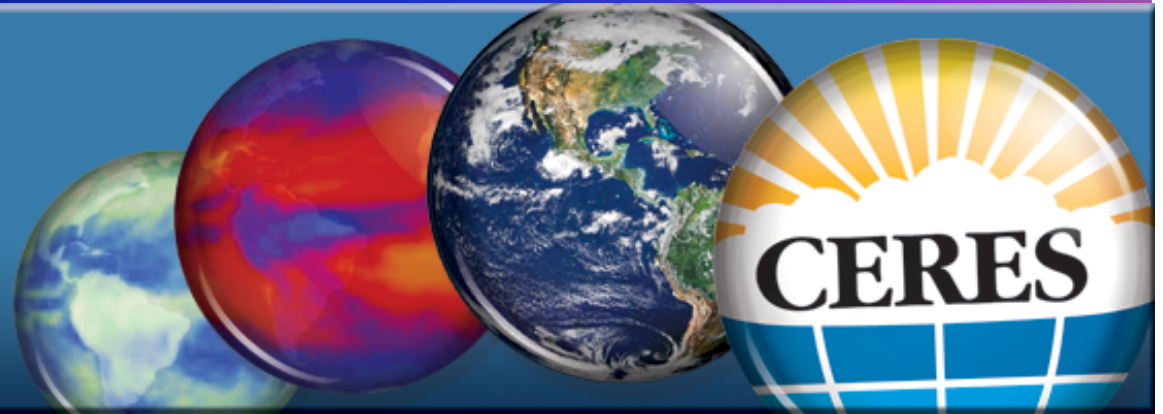
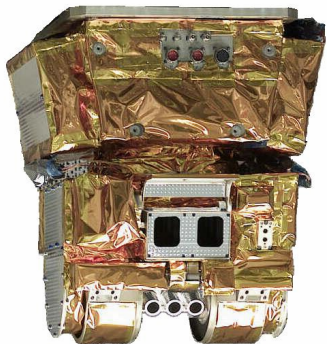


Clouds and the Earth's Radiant Energy System

Clouds and the Earth's Radiant Energy System

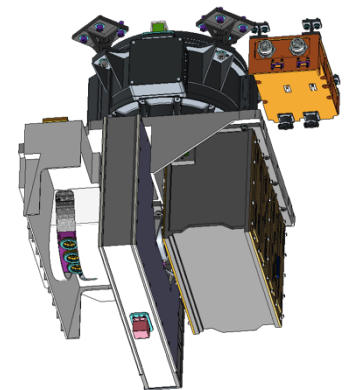


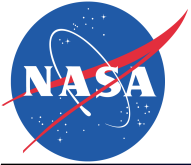
CERES Flight Model 6 & Radiation Budget Instrument (RBI) Status



Kory Priestley

CERES Science Team Meeting
University of Washington
Seattle, WA
September 1st, 2015

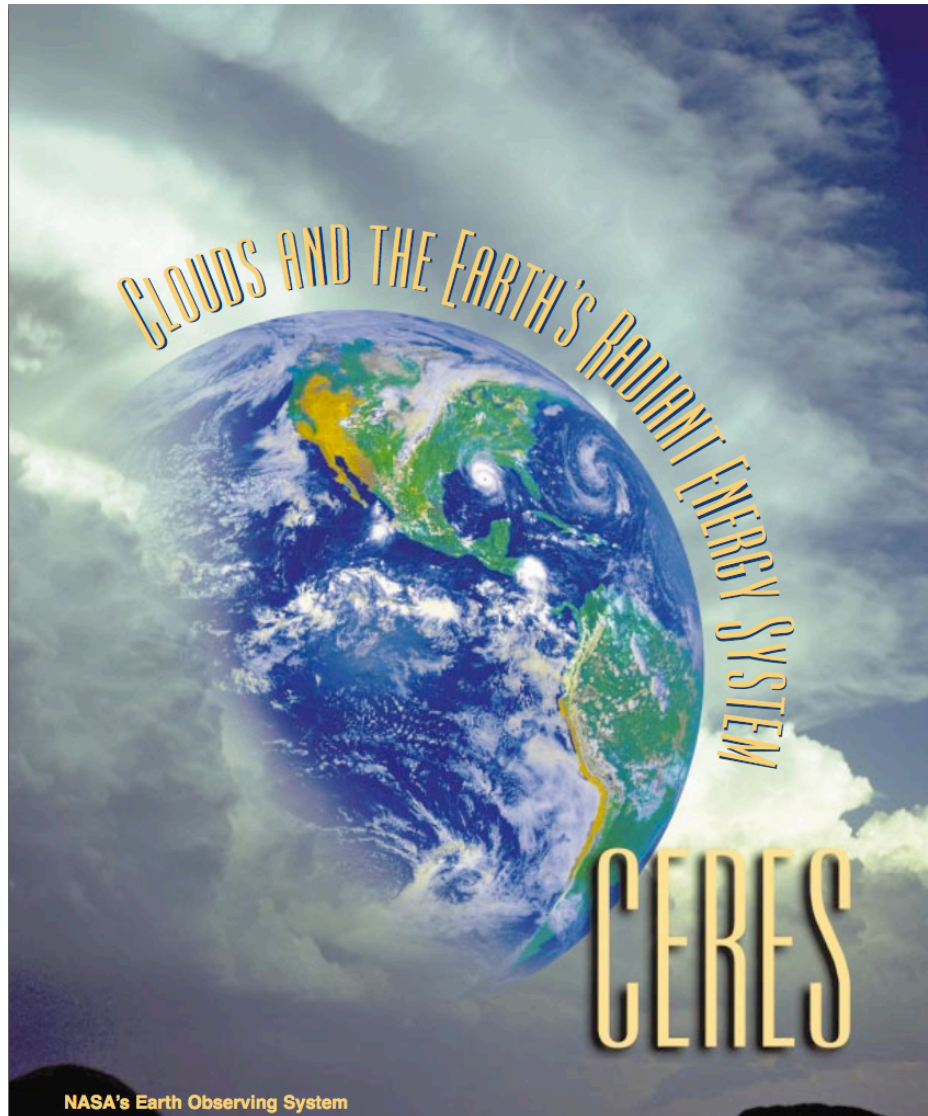




Discussion Topics



Clouds and the Earth's Radiant Energy System



- **ERB missions Overview**
 - Flight history/future
- **Instrument Status**
 - FM-6 on JPSS-1
 - RBI on JPSS-2
- **Summary**

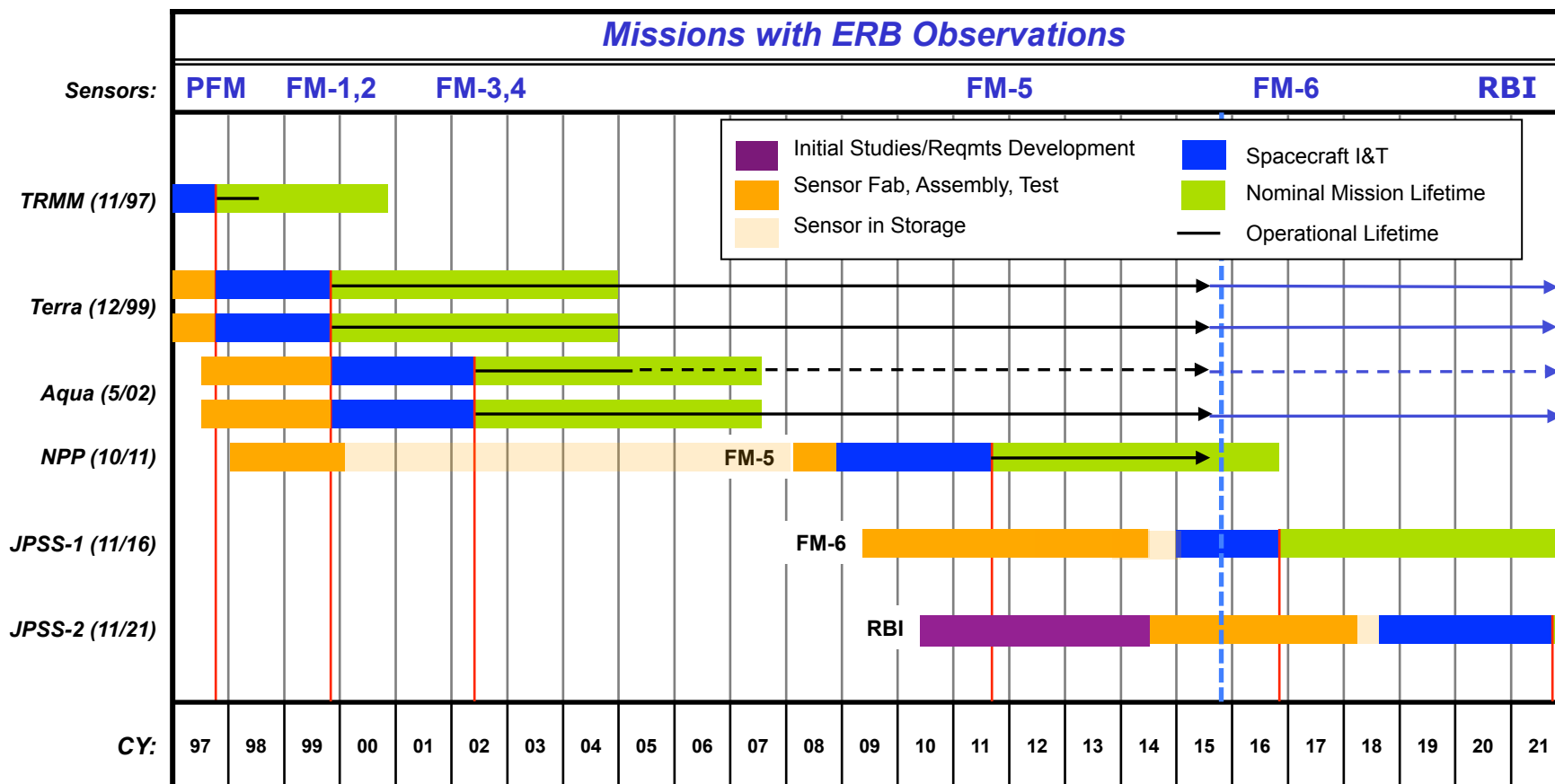


Climate Data Record Continuity

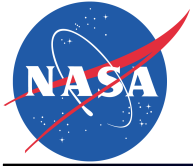


Clouds and the Earth's Radiant Energy System

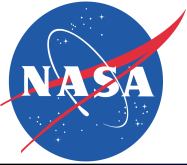
CERES/RBI Flight Schedule



We now have over 63 years of flight experience with the CERES instruments



CERES FM-6

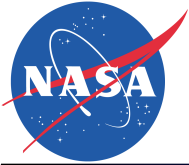


JPSS-1 Satellite I&T Overview



Clouds and the Earth's Radiant Energy System

- **Ball Aerospace & Technologies Corporation (BATC) in Boulder, CO is the JPSS-1 spacecraft provider and satellite integrator**
 - BATC was also NPP S/C provider and integrator
- **NGST will run first Bench Acceptance Test at BATC**
- **NASA LaRC personnel will perform CERES I&T activities at BATC**
- **JPSS will coordinate launch operations through NASA KSC**
 - Launch will be from Vandenberg Air Force Base, CA (same as NPP)
 - Launch vehicle provider has not been selected yet
- **I&T will heavily leverage success accomplished on NPP**
 - Reuse NPP I&T flow & procedures minimizing changes
 - Integrate lessons learned from NPP for JPSS-1 I&T

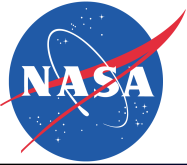


CERES FM-6 Upcoming Activities



Clouds and the Earth's Radiant Energy System

- **CERES Delivery to BATC** **June 2014**
- **CERES Bench Acceptance Test** **June 2014**
- **First Instrument Integrated (CERES):** **October 2014**
- **Last Instrument Integrated:** **May 2015**
- **Satellite Pre-Environmental Review:** **August 2015**
 - **Dynamics Testing Complete** **November 2015**
 - **EMI – EMC Complete** **February 2016**
 - **TVAC Complete** **March 2016**
- **Satellite I&T Complete:** **May 2016**
- **Ship to Launch Site:** **September 2016**
- **Launch Readiness Date:** **October 2016**



CERES FM-6 I&T Team



Clouds and the Earth's Radiant Energy System

- **CERES I&T Activities for integration to JPSS-1 are being planned**
 - Activities and documents are being coordinated with BATC
- **CERES Project expects to retain most key I&T personnel from CERES FM5 on NPP**
 - Some new personnel will be added and young team members to be mentored to gain experience for longevity
- **I&T staffing levels are planned and conflicts with other LaRC Projects seems manageable**
- **CERES Team personnel have already been participating in I&T discussions with JPSS and BATC**

CERES Team will be ready to support JPSS-1 Satellite I&T

National Aeronautics and Space Administration

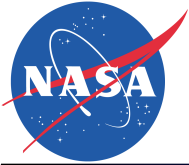


Radiation Budget Instrument

RBI Instrument Overview

Kory Priestley, *Project Scientist*

www.nasa.gov



RBI is a New Instrument Developed as a Follow-on to CERES Flown on TRMM, EOS, NPP, and JPSS-1



Clouds and the Earth's Radiant Energy System

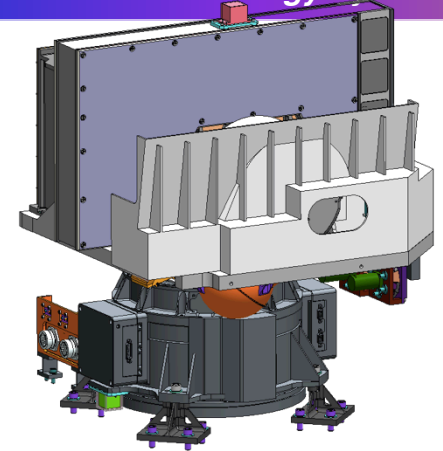
Radiation Budget Instrument (RBI)

Partnerships and Teams

- **NASA/ NOAA Partnership**
 - NOAA provides JPSS-2 satellite for accommodation of RBI
 - NASA provides RBI instrument and support through spacecraft I&T and launch/activation
 - NASA funds radiation budget science data analysis and generation of science products (RBM Project)
- **NASA Langley**
 - Manages prime contractor development of RBI instrument, provides management, technical, and mission assurance insight and oversight; provides support to spacecraft I&T thru launch and early on-orbit checkout (thru Phase D)
 - Hand-over and release of RBI instrument ownership by RBI Project occurs at the JPSS-2 Operational Hand-over Review (OHR). For Phase E, the Langley Science Directorate (SD) Radiation Budget Measurement (RBM) Project assumes responsibility for RBI for mission planning and operations
- **Exelis Inc.**
 - RBI Instrument provider/prime contractor with sub-contractors providing key elements and support (SDL for Calibration, JPL for Thermopile Detectors, Sierra Nevada for Azimuth Rotation Module)
- **JPSS-2 Spacecraft and Mission Interface**
 - Interface Control (ICD & MICD) and Data Format

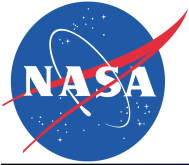
RBI scanning radiometer measuring three spectral bands at top of Atmosphere (TOA)

- Total 0.3 to $> 50\mu\text{m}$
- Shortwave 0.3 to $5.0\mu\text{m}$
- Longwave 5.0 to $50\mu\text{m}$



Science Goal

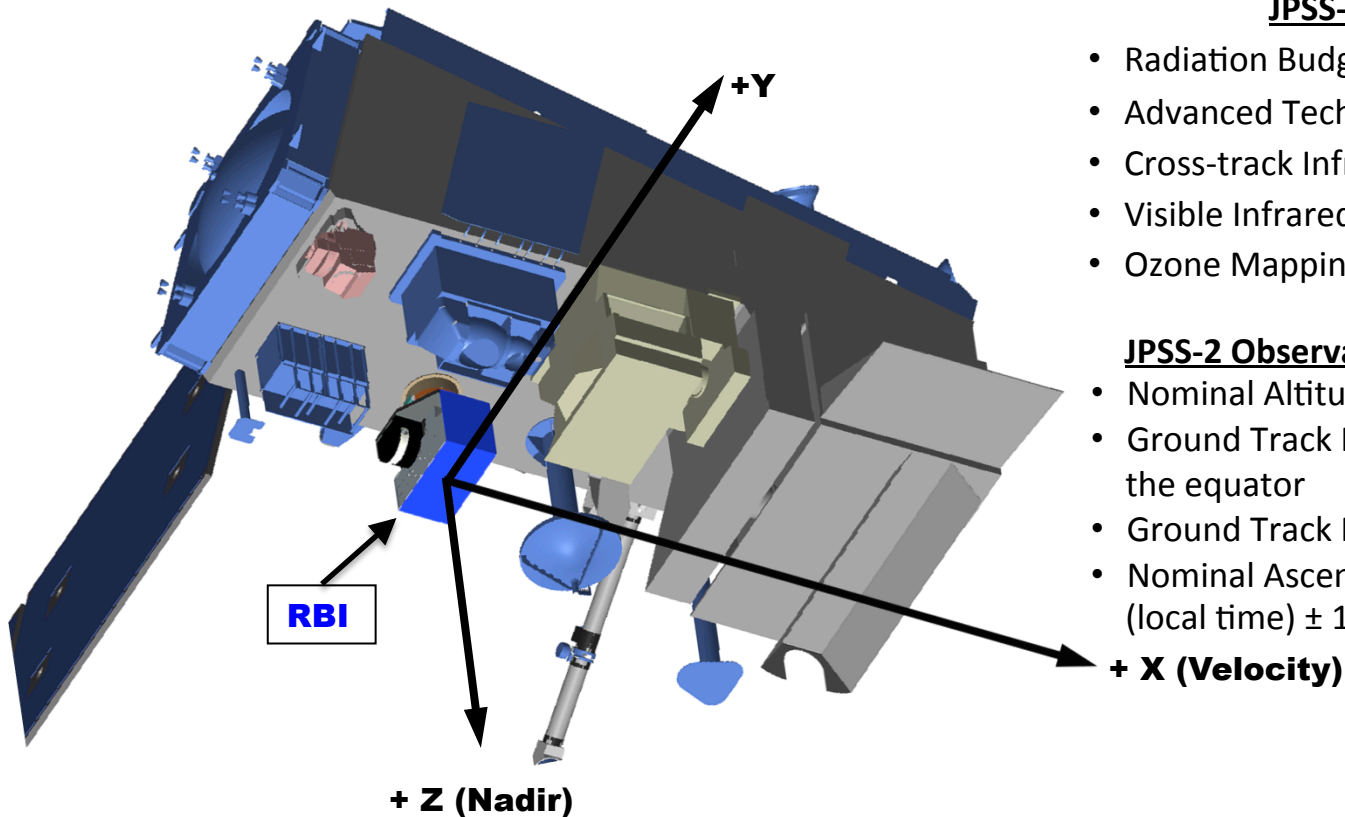
- To continue the measurements from the last two decades in support of global climate monitoring.
 - RBI extends the Earth radiation budget measurements of the Earth Observing System (EOS) and Joint Polar Satellite System (JPSS)
-
- Category 3 Mission per NPR 7120.5E
 - Risk Classification B per 8705.4
 - Follow-on instrument to the Clouds and the Earth's Radiant Energy System (CERES)
 - Flight Instrument Complete – Exelis CBE is May 2018
 - Flight Instrument Delivery – NLT April 2019 (per NOAA/NASA IAA)
 - “Notional” JPSS-2 on-dock delivery date – Nov 2018 (TBR after JPSS-2 spacecraft is awarded, April 2015)



RBI Accommodated on JPSS-2 Spacecraft Nadir Deck



Clouds and the Earth's Radiant Energy System



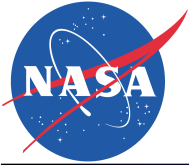
JPSS-2 Instrument Complement

- Radiation Budget Instrument (RBI)
- Advanced Technology Microwave Sounder (ATMS)
- Cross-track Infrared Sounder (CrIS)
- Visible Infrared Imaging Radiometer Suite (VIIRS)
- Ozone Mapping and Profiler Suite (OMPS)

JPSS-2 Observatory Requirements

- Nominal Altitude: $824 \text{ km} \pm 17 \text{ km}$
- Ground Track Repeatability Accuracy: $\pm 20 \text{ km}$ at the equator
- Ground Track Repeat Cycle: $< 20 \text{ days}$
- Nominal Ascending Equator Crossing Time: 1330 (local time) $\pm 10 \text{ min}$

Spacecraft design and Instrument locations are notional and representative of JPSS-1
JPSS-2 configuration has not been determined



Chronology and Recent Developments



Clouds and the Earth's Radiant Energy System

- ◆ **5/14/14: RBI contract Awarded to Exelis**
- ◆ **12/10/14: System Requirements Review (SRR) completed**
- ◆ **6/9/15: Gov't issued a stop work order and Cure Letter**
- ◆ **8/21/15: Exelis given approval to resume work on RBI**

- ◆ **Next Steps:**
 - Management face-to-face meeting 26 & 27 August (complete)
 - Ensure that desired baseline is understood and agreed upon
 - Technical leads face-to-face meeting.
 - Tentatively scheduled for week of September 7.
- ◆ **Deliver the RBI instrument to meet the JPSS-2 launch**
 - Date will be adjusted to take the stop work period into account
 - NASA will work the delivery with JPSS-2
- ◆ **No requirements have been changed**